1.

(Original)

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IN THE CLAIMS

A read channel, comprising:

This listing of claims will replace all prior versions, and listings, of claims in the application:

2 an equalizer configured to equalize a digital signal to provide equalized 3 reproduced signals; and 4 a Viterbi detector capable of receiving the equalized reproduced signals and 5 converting the reproduced signals into a digital output signal indicative of data stored on 6 a recording medium; 7 wherein the equalizer is implemented using a coefficient learning circuit that 8 adaptively updates coefficients for the equalizer based upon a cosine function. 1 2. (Original) The read channel of claim 1, wherein the coefficient 2 learning circuit adjusts coefficients using a tap coefficient update equation having a first 3 parameter, k, for modifying a magnitude response. 3. 1 (Previously Presented) The read channel of claim 2, wherein the 2 first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k is the 3 cosine equalizer parameter for modifying the magnitude response, g is an update 4 attenuation gain, f() is a predetermined cosine function, a_{k+1} represents a bit to be 5 detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error 6 signal based on a difference between a noisy equalized signal and a desired noiseless 7 signal.

- 1 4. (Original) The read channel of claim 2, wherein the coefficient
- 2 learning circuit adjusts coefficients using a tap coefficient update equation having a
- 3 second parameter, j, for modifying a phase response.
- 1 5. (Previously Presented) The read channel of claim 4, wherein the
- second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where j is the
- 3 cosine equalizer parameter for modifying the phase response, g is an update attenuation
- 4 gain, f() is a predetermined cosine function, a_{k+2} represents a bit to be detected at time
- 5 k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error signal based on a
- 6 difference between a noisy equalized signal and a desired noiseless signal.
- 1 6. (Original) The read channel of claim 1, wherein the coefficient
- 2 learning circuit adjusts coefficients using a tap coefficient update equation having a
- 3 parameter, j, for modifying a phase response.
- 1 7. (Currently Amended) The read channel of claim 1, wherein the coefficient
- learning circuit adjusts coefficients, w_i , according to $w_i=w_i-g^*f(a_{k-i})^*e_k$, where g is a
- 3 provided update attenuation gain and [[$f(a_{k-i})$]] $\underline{f()}$ is a predetermined cosine function
- 4 and [[a_{k+i}]] \underline{a}_{k-i} represents a bit to be detected at time [[k+I]] $\underline{k-i}$.
- 1 8. (Original) The read channel of claim 7, wherein $f(a_{k-1})$ is chosen to be
- a_{k-i} - a_{k-i-2} , wherein written bits that are to be detected, a_{k-i} , are convolved with a PR4
- 3 response based upon the cosine function.

1 9. (Original) The read channel of claim 7, wherein $f(a_{k-1})$ is chosen to be 2 $a_{k-i} + a_{k-i-1} - a_{k-i-2} - a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are convolved 3 with the EPR4 response based upon the cosine function. 1 10. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be 2 $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k based upon 3 the cosine function. 1 11. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be 2 $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k based upon 3 the cosine function. (Original) 1 12. A waveform equalizer that equalizes a waveform of a 2 reproduction signal obtained by reproducing marks and non-marks recorded on a 3 recording medium, comprising: 4 a delay element that delays a propagation of the reproduced signal; 5 a plurality of multipliers that multiply predetermined coefficients by the 6 reproduction signal and the delayed signal from the delay element; 7 a coefficient learning circuit that adaptively updates the predetermined 8 coefficients for each of the plurality of multipliers; and 9 an adder that adds outputs from the plurality of multipliers; 10 wherein the coefficient learning circuit adaptively updates coefficients for the 11 equalizer based upon a cosine function.

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- 1 13. (Original) The waveform equalizer of claim 12, wherein the
- 2 coefficient learning circuit adjusts coefficients using a tap coefficient update equation
- 3 having a first parameter, k, for modifying a magnitude response.
- 1 14. (Previously Presented) The waveform equalizer of claim 13,
- wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k
- 3 is the cosine equalizer parameter for modifying the magnitude response, g is an update
- 4 attenuation gain, f() is a predetermined cosine function, a_{k+1} represents a bit to be
- detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error
- 6 signal based on a difference between a noisy equalized signal and a desired noiseless
- 7 signal.
- 1 15. (Original) The waveform equalizer of claim 13, wherein the
- 2 coefficient learning circuit adjusts coefficients using a tap coefficient update equation
- 3 having a second parameter, j, for modifying a phase response.
- 1 16. (Previously Presented) The waveform equalizer of claim 15,
- wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where
- 3 j is the cosine equalizer parameter for modifying the phase response, g is an update
- 4 attenuation gain, f() is a predetermined cosine function, a_{k+2} represents a bit to be
- 5 detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error
- 6 signal based on a difference between a noisy equalized signal and a desired noiseless
- 7 signal.

- 1 17. (Original) The waveform equalizer of claim 12, wherein the
- 2 coefficient learning circuit adjusts coefficients using a tap coefficient update equation
- 3 having a parameter, j, for modifying a phase response.
- 1 18. (Currently Amended) The waveform equalizer of claim 12, wherein the
- 2 coefficient learning circuit adjusts coefficients, w_i , according to $w_i=w_i-g^*f(a_{k-i})^*e_k$,
- 3 where g is a provided update attenuation gain and and $[[f(a_{k-i})]]$ f() is a predetermined
- 4 cosine function and [[a_{k+i}]] $\underline{a_{k-i}}$ represents a bit to be detected at time [[k+I]] $\underline{k-i}$.
- 1 19. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-1})$ is
- 2 chosen to be a_{k-i} - a_{k-i-2} , wherein written bits that are to be detected, a_{k-i} , are convolved
- 3 with a PR4 response based upon the cosine function.
- 1 20. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is
- 2 chosen to be $a_{k-i} + a_{k-i-1} a_{k-i-2} a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are
- 3 convolved with the EPR4 response based upon the cosine function.
- 1 21. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-1})$ is
- 2 chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k
- 3 based upon the cosine function.

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signal.

1 22. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is 2 chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k 3 based upon the cosine function. 1 23. (Original) A signal processing system, comprising: 2 memory for storing data therein; and 3 a processor, coupled to the memory, for equalizing a digital signal to provide 4 equalized reproduced signals, the processor adaptively updates coefficients for the 5 equalizer based upon a cosine function. 1 24. (Original) The signal processing system of claim 23, wherein the 2 processor adjusts coefficients using a tap coefficient update equation having a first 3 parameter, k, for modifying a magnitude response. 1 25. (Previously Presented) The signal processing system of claim 24, 2 wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k 3 is the cosine equalizer parameter for modifying the magnitude response, g is an update 4 attenuation gain, f() is a predetermined cosine function, a_{k+1} represents a bit to be 5 detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error 6 signal based on a difference between a noisy equalized signal and a desired noiseless

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- 1 26. (Original) The signal processing system of claim 24, wherein the
- 2 processor adjusts coefficients using a tap coefficient update equation having a second
- 3 parameter, j, for modifying a phase response.
- 1 27. (Previously Presented) The signal processing system of claim 26,
- wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where
- 3 j is the cosine equalizer parameter for modifying the phase response, g is an update
- 4 attenuation gain, f() is a predetermined cosine function, a_{k+2} represents a bit to be
- detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error
- 6 signal based on a difference between a noisy equalized signal and a desired noiseless
- 7 signal.
- 1 28. (Original) The signal processing system of claim 23, wherein the
- 2 processor adjusts coefficients using a tap coefficient update equation having a parameter,
- 3 j, for modifying a phase response.
- 1 29. (Currently Amended) The signal processing system of claim 23, wherein
- 2 the coefficient learning circuit adjusts coefficients, w_i , according to $w_i=w_i-g^*f(a_{k-i})^*e_k$,
- 3 where g is a provided update attenuation gain and and [[$f(a_{k-i})$]] $\underline{f()}$ is a predetermined
- 4 cosine function and [[a_{k+i}]] $\underline{a_{k-i}}$ represents a bit to be detected at time [[k+I]] $\underline{k-i}$.

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- 1 30. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is
- 2 chosen to be a_{k-i} - a_{k-i-2} , wherein written bits that are to be detected, a_{k-i} , are convolved
- 3 with a PR4 response based upon the cosine function.
- 1 31. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is
- 2 chosen to be $a_{k-i} + a_{k-i-1} a_{k-i-2} a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are
- 3 convolved with the EPR4 response based upon the cosine function.
- 1 32. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is
- 2 chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k
- 3 based upon the cosine function.
- 1 33. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is
- 2 chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k
- 3 based upon the cosine function.

1	34. (Original) A magnetic storage device, comprising:
2	a magnetic storage medium for recording data thereon;
3	a motor for moving the magnetic storage medium;
4	a head for reading and writing data on the magnetic storage medium;
5	an actuator for positioning the head relative to the magnetic storage medium; and
6	a data channel for processing encoded signals on the magnetic storage medium,
7	the data channel comprising an equalizer configured to equalize a digital signal to
8	provide equalized reproduced signals and a Viterbi detector capable of receiving the
9	equalized reproduced signals and converting the reproduced signals into a digital output
10	signal indicative of data stored on a recording medium; wherein the equalizer is
11	implemented using a coefficient learning circuit that adaptively updates coefficients for
12	the equalizer based upon a cosine function.
1	35. (Original) The magnetic storage device of claim 34, wherein the
2	equalizer adjusts coefficients using a tap coefficient update equation having a first
3	parameter, k, for modifying a magnitude response.

- 1 36. (Previously Presented) The magnetic storage device of claim 35,
- wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k
- 3 is the cosine equalizer parameter for modifying the magnitude response, g is an update
- 4 attenuation gain, f() is a predetermined cosine function, a_{k+1} represents a bit to be
- detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error
- 6 signal based on a difference between a noisy equalized signal and a desired noiseless
- 7 signal.
- 1 37. (Original) The magnetic storage device of claim 35, wherein the
- 2 equalizer adjusts coefficients using a tap coefficient update equation having a second
- 3 parameter, j, for modifying a phase response.
- 1 38. (Previously Presented) The magnetic storage device of claim 37,
- wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where
- 3 j is the cosine equalizer parameter for modifying the phase response, g is an update
- 4 attenuation gain, f() is a predetermined cosine function, a_{k+2} represents a bit to be
- detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error
- 6 signal based on a difference between a noisy equalized signal and a desired noiseless
- 7 signal.
- 1 39. (Original) The magnetic storage device of claim 34, wherein the
- 2 equalizer adjusts coefficients using a tap coefficient update equation having a parameter,
- 3 j, for modifying a phase response.

- 1 40. (Currently Amended) The magnetic storage device of claim 34, wherein
- 2 the coefficient learning circuit adjusts coefficients, w_i , according to $w_i=w_i-g^*f(a_{k-i})^*e_k$,
- 3 where g is a provided update attenuation gain and and [[$f(a_{k-i})$]] $\underline{f()}$ is a predetermined
- 4 cosine function and [[a_{k+i}]] \underline{a}_{k-i} represents a bit to be detected at time [[k+I]] $\underline{k-i}$.
- 1 41. (Original) The magnetic storage device of claim 40, wherein $f(a_{k-1})$ is
- 2 chosen to be a_{k-i} - a_{k-i-2} , wherein written bits that are to be detected, a_{k-i} , are convolved
- 3 with a PR4 response based upon the cosine function.
- 1 42. (Original) The magnetic storage device of claim 40, wherein $f(a_{k-1})$ is
- 2 chosen to be $a_{k-i} + a_{k-i-1} a_{k-i-2} a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are
- 3 convolved with the EPR4 response based upon the cosine function.
- 1 43. (Original) The magnetic storage device of claim 40, wherein $f(a_{k-i})$ is
- 2 chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k
- 3 based upon the cosine function.
- 1 44. (Original) The magnetic storage device of claim 40, wherein $f(a_{k-1})$ is
- 2 chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k
- 3 based upon the cosine function.

1	45. (Original) A read channel, comprising:
2	means for equalizing a digital signal to provide equalized reproduced signals; and
3	means, coupled to the means for equalizing, for receiving the equalized
4	reproduced signals and converting the reproduced signals into a digital output signal
5	indicative of data stored on a recording medium;
6	wherein the means for equalizing is implemented using means for adaptively
7	updating coefficients for the means for equalizing based upon a cosine function.
1	46. (Original) A waveform equalizer that equalizes a waveform of a
2	reproduction signal obtained by reproducing marks and non-marks recorded on a
3	recording medium, comprising:
4	means for delaying propagation of a reproduced signal;
5	means for multiplying predetermined coefficients by the reproduced signal and
6	the delayed signal from the means for delaying;
7	means for adaptively updating the predetermined coefficients for the means for
8	multiplying; and
9	means for adding outputs from the means for multiplying;
10	wherein the means for adaptively updating the predetermined coefficients updates
11	the predetermined coefficients based upon a cosine function.